



University of **HUDDERSFIELD**

University of Huddersfield Repository

Hubbard, Peter, Ward, Chris, Dixon, Roger and Goodall, Roger M.

Real Time Detection of Low Adhesion in the Wheel/Rail Contact

Original Citation

Hubbard, Peter, Ward, Chris, Dixon, Roger and Goodall, Roger M. (2012) Real Time Detection of Low Adhesion in the Wheel/Rail Contact. In: RRUKA Annual Conference 2012, 8th November 2012, London, UK.

This version is available at <http://eprints.hud.ac.uk/id/eprint/17703/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

<http://eprints.hud.ac.uk/>



The
University
Of
Sheffield.



The University of
Nottingham

Peter Hubbard
Chris Ward
Roger Dixon
Roger Goodall

“Real Time Detection of Low-Adhesion in the Wheel Rail Contact”

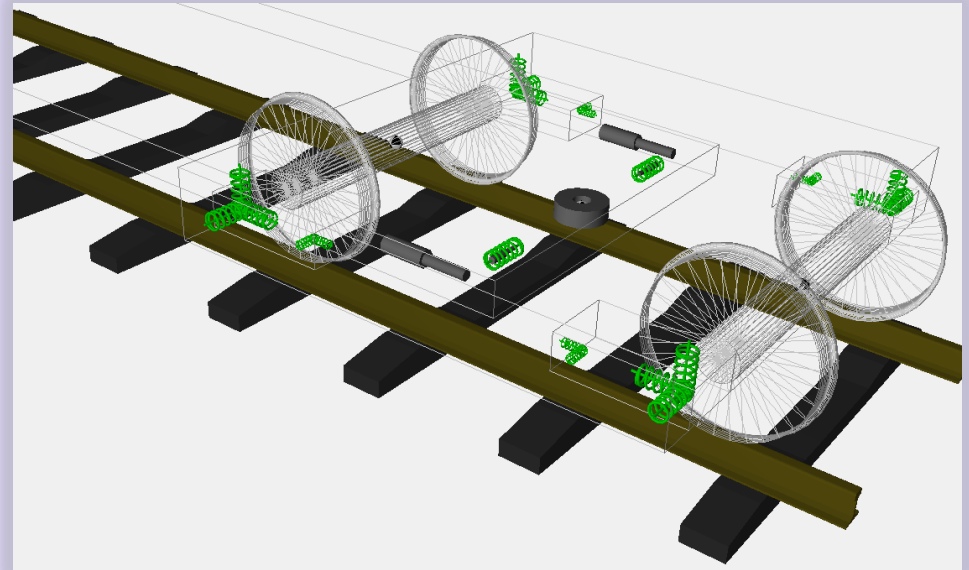
What is low adhesion?

- Braking relies on contact friction
- Reduced by
 - Leaf contaminant
 - Rain and ice
 - Oil contaminant
 - 'Micro-wetting'
- SPADs
 - Cat. A ≈ 300 /year
 - Stonegate cl. 375, 8/11/2010
 - Train at 100kph
 - Expected to stop in 1240m
 - Took 5180m, 3940m past the station

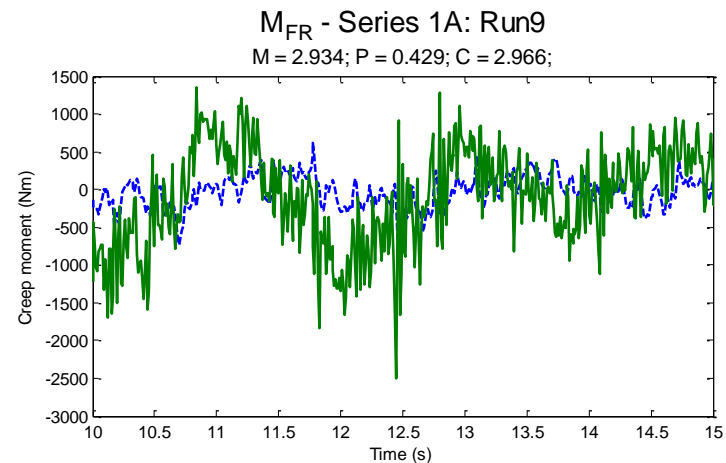
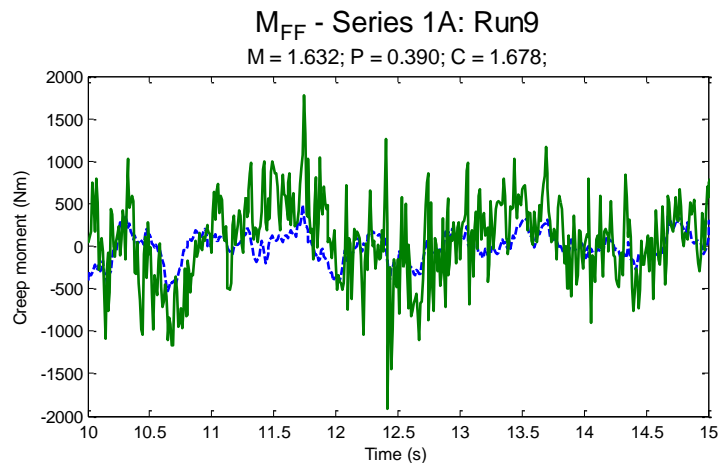
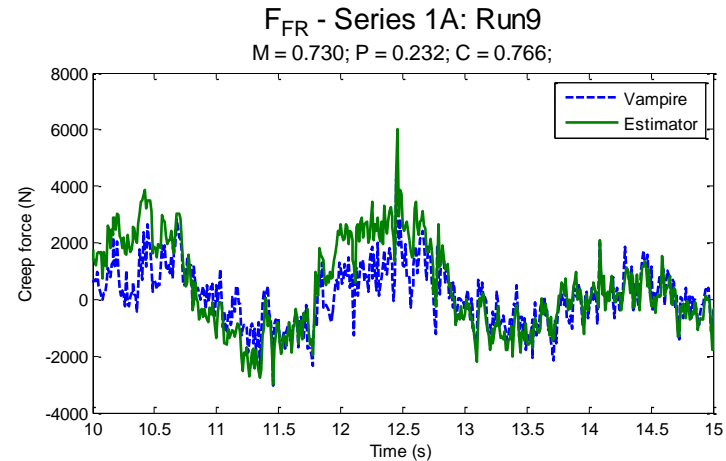
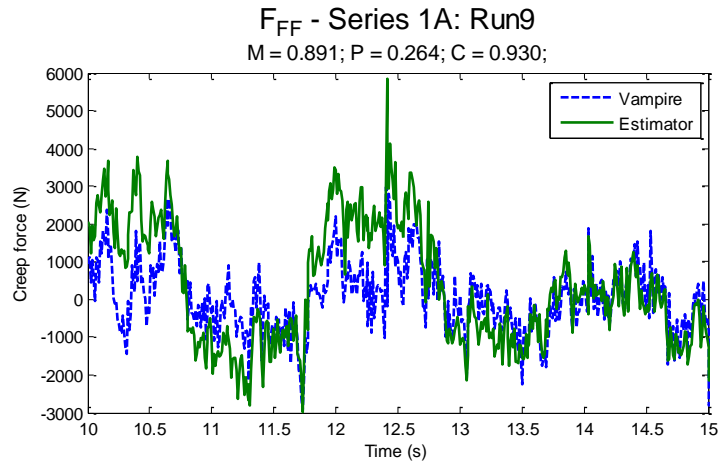


Methodology

- Linear Plan-view model
- Form Kalman-Bucy filter
- Estimate Contact Forces
 - (augmented states)
- Use relationships with dynamics to approximate adhesion

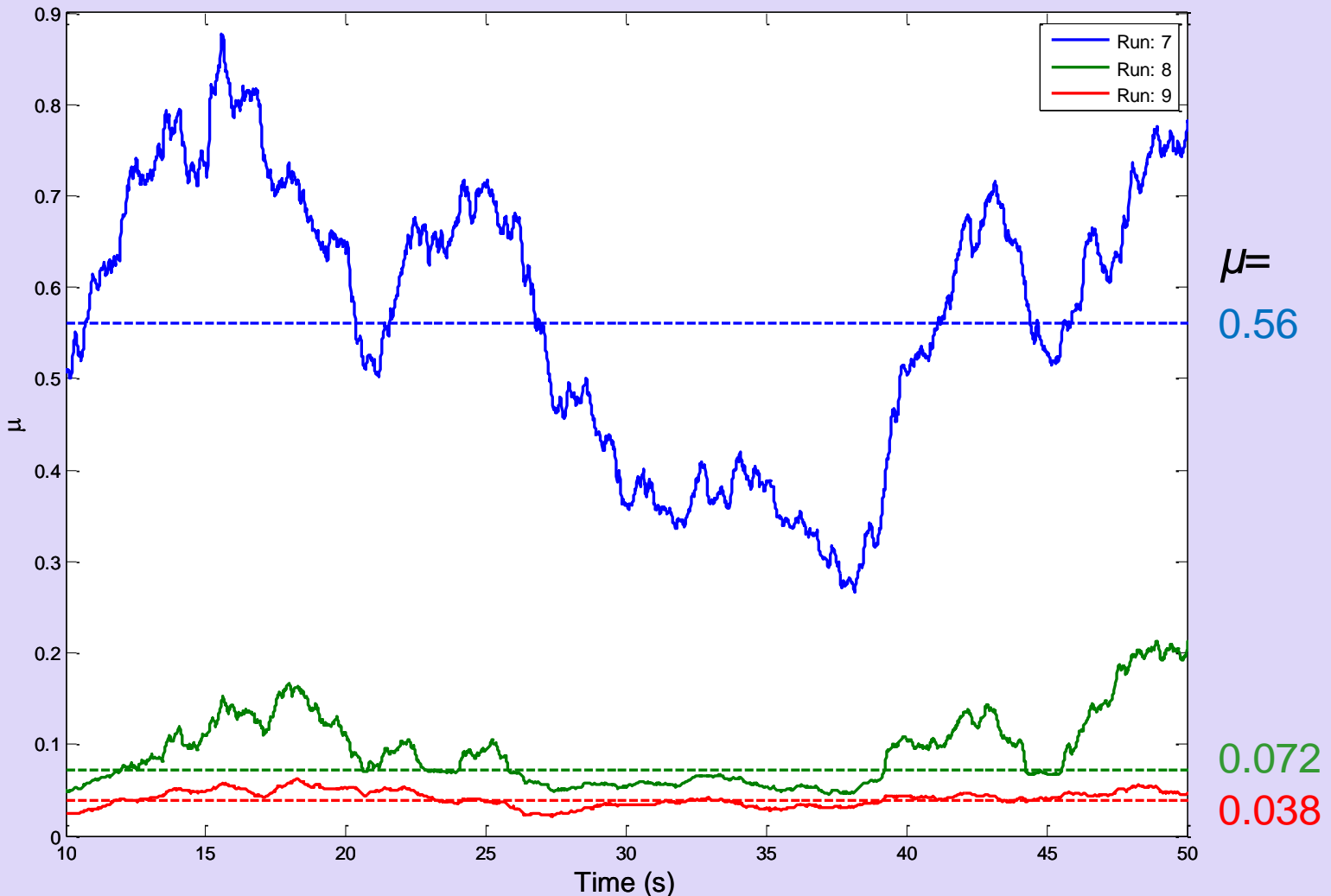


Results – Comparison to ‘real’ VAMPIRE data



Results – Comparison to ‘real’ VAMPIRE data

Adhesion Estimation - Series 1A Datasets
RMS window: 5s





Conclusions

- Reasonable approximation of adhesion estimation
 - Direct data methods showing good results too
- Success against 'Blind Data'
- Progression to track testing – June 2013?